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Murata Power Solutions

SPM15 Series

Single Output Potted Metal Package
Isolated 15-Watt DC-DC Converters

Typical unit

FEATURES

- Wide range input voltages 9-36 and 18-75 Vdc
- 1″ x 1″ x 0.41″ Dimensions.
- Adjustable Vout (+10% to -10%)
- High Efficiency
- Positive & Negative logic, Remote On/Off control Option
- Monotonic startup
- Continuous Short Circuit protection
- Over-temperature protection
- Over-Voltage protection
- Low output ripple and noise
- Strong thermal derating characteristics
- Operational Temperature Range –40°C to +85°C
- 1600V I/O isolation
- Packaged in a five-sided EMI shielding metal package with non-conductive base
- Certified to UL 60950-1, CAN/CSA-C22.2 No. 60950-1, IEC60950-1, safety approvals, 2nd edition, with AM1

PRODUCT OVERVIEW

The SPM15 series isolated DC-DC converters represent the next generation in Industrial Potted Module Technology. Featuring a full 15-Watt output in one square inch of board area, the SPM15 series isolated DC-DC converter family offers efficient regulated DC power for printed circuit board mounting. The 1″ x 1″ x 0.41″ (25.4 x 25.4 x 10.41 mm) converter accepts a wide range of input voltages, ideal for industrial applications.

Intended target markets include transportation, medical systems, electronic test equipment, industrial processing equipment, industrial applications where power modules must meet rugged environmental requirements, high power density, and where isolated output voltages are required. These converters offer a feature/option set including: through-hole mounting, positive or negative logic (remote on/off), over-current & over-temperature protection, under-voltage lockout. The input voltage range covers the standard Industrial requirements with a regulated output voltage and power rating up to 15W.

Modules provide voltage isolation (basic insulation) from input to output of up to 1600V. The Operating Ambient Temperature Range is -40°C to +85°C.The Module delivers full output power to +70°C with no airflow. These parts are ideal for applications that do not require any heat sinking or forced air cooling.

RoHS COMPLIANT

For full details go to
www.murata-ps.com/rohs

PERFORMANCE SPECIFICATIONS SUMMARY AND ORDERING GUIDE ① ③

Root Models ①	Output							Input				Efficiency (%)		Dimensions	
	V_{OUT} (V)	I_{OUT} (A, max)	Total Power (W)	R/N (mVp-p) Typ. ②	R/N (mVp-p) Max.	Regulation (Max.) Line	Regulation (Max.) Load	V_{IN} Nom. (V)	Range (V)	I_{IN}, min. load (mA)	I_{IN}, full load (A)	Min.	Typ.	Case (inches)	Case (mm)
SPM15-033-Q12	3.3	4.5	14.85	60	100	±0.25	±0.25	24	9-36	100	0.695	86.5	89	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-033-Q48	3.3	5	16.5	30	60	±0.25	±0.25	48	18-75	60	0.76	88.5	90	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-050-Q12	5	3	15	40	70	±0.05%	±0.1%	24	9-36	105	0.71	85.5	88	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-050-Q48	5	3	15	60	95	±0.3%	±0.2%	48	18-75	56	0.35	86.5	88.5	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-120-Q12	12	1.3	15.6	60	120	±0.05%	±0.1%	24	9-36	110	0.77	82.3	84	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-120-Q48	12	1.3	15.6	85	120	±0.075%	±0.05%	48	18-75	56	0.76	82	84	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-150-Q12	15	1.1	16.5	130	175	±0.1%	±0.1%	24	9-36	130	0.82	82.5	84	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41
SPM15-150-Q48	15	1.1	16.5	80	150	±0.1%	±0.075%	48	18-75	60	0.41	83	84.5	1.0 x 1.0 x 0.41	25.4 x 25.4 x 10.41

Notes:

① Please refer to the part number structure for additional options and complete ordering part numbers.

② Ripple and Noise is shown at 20 MHz bandwidth.

③ All specifications are at nominal line voltage and full load, +25 °C. unless otherwise noted. See detailed specifications for full conditions.

INPUT/OUTPUT EXTERNAL TEST CAPACITORS

Model	Input Capacitor (electrolytic)	Output Capacitor(s)
SPM15-033-Q12	100 µF	1µF ceramic & 10µF tantalum
SPM15-033-Q48	4.7 µF	
SPM15-050-Q12	100 µF	
SPM15-050-Q48	4.7 µF	
SPM15-120-Q12	100 µF	
SPM15-120-Q48	4.7 µF	
SPM15-150-Q12	100 µF	
SPM15-150-Q48	4.7 µF	

PART NUMBER STRUCTURE

SPM15 - 120 - Q48 P Lx - C

Single Output Potted Module 15-Watt Series

Nominal Output Voltage in Tenths of a Volt
(033 = 3.3V, 050 = 5V, 120 = 12V, 150 = 15V)

Input Voltage Range
Q12 = 9-36 Vdc
Q48 = 18-75Vdc

On/Off Control Logic
Blank = No On/Off & no Trim
P = Positive
N = Negative

Pin Length Option (through-hole only)
Blank = Std. pin length 0.15″ (3.8mm)
L1 = 0.110″ (2.79mm) ①

RoHS-6 Hazardous Substance Compliance
(Does not claim EU RoHS exemption 7b, lead in solder)

① **Special quantity order is required; samples available with standard pin length only.**

② **Some model number combinations may not be available. See website or contact your local Murata sales representative.**

FUNCTIONAL SPECIFICATIONS – MODEL SPM15-033-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.46		15.07	W
Output Current	Current-limited, no damage, short-circuit protected	0.45		4.5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.5	9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	7.7	8.3	8.9	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.695	0.726	A
Low Line Input Current	Vin = minimum		1.89	1.947	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			50	100	A
Minimum Load Input Current	Iout = minimum, unit=ON		100	125	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30	50	mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	86.5	89		%
	Vin = min., full load	86	87.3		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		2		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		325	350	375	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		60	100	µSec
Dynamic Load Peak Deviation	same as above		±75	±150	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-033-Q12

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.46	14.85	15.07	W
Voltage					
Nominal Output Voltage	No trim	3.251	3.3	3.35	Vdc
Setting Accuracy	At 50% load, no trim	-1.5		1.5	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom
Overvoltage Protection	Via magnetic feedback	3.7	4.9	5.4	Vdc
Current					
Output Current Range		0.45	4.5	4.5	A
Current Limit Inception	98% of Vnom., after warmup	4.9	7.5	8.5	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout		0.321		A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.25	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=24V		60	90	mV pk-pk
Maximum Capacitive Loading	Low ESR			1000	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		85	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	110	115	120	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

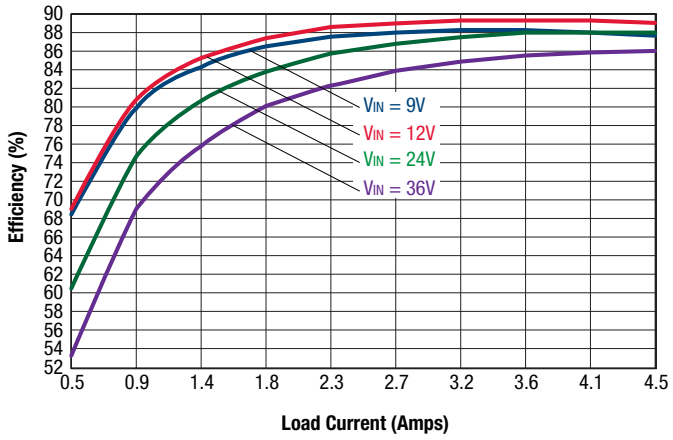
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

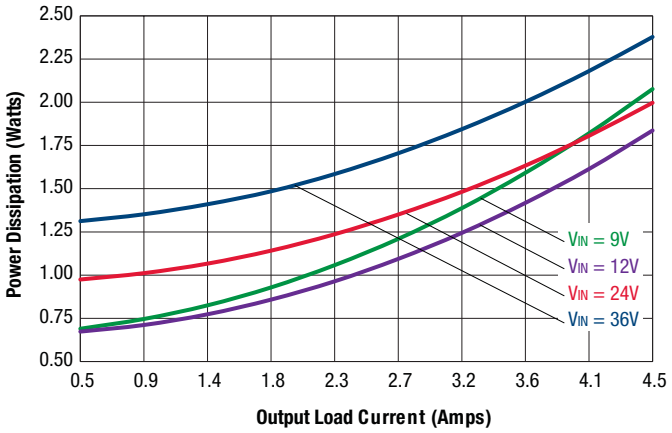
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-033-Q12

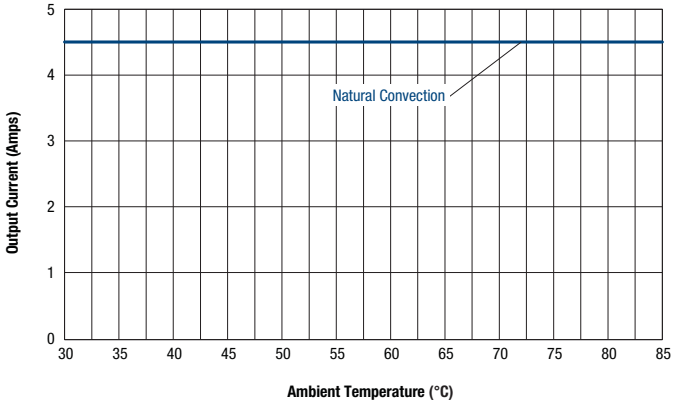
Efficiency vs. Line Voltage and Load Current @ 25°C



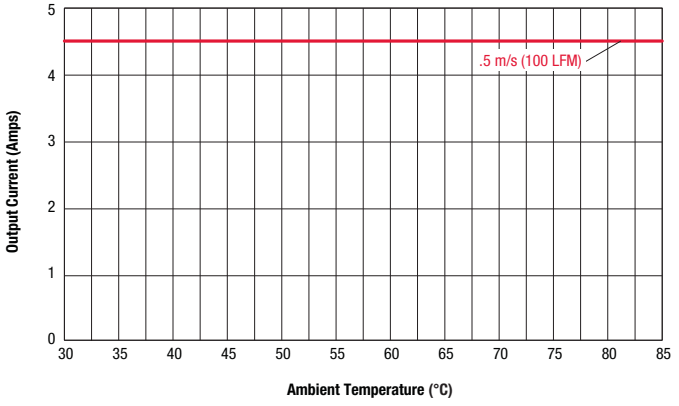
Power Dissipation



Maximum Current Temperature Derating at sea level
Vin = 9V, 12V, or 24V (air flow from Pin J1 to Pin J2 on PCB)



Maximum Current Temperature Derating at sea level
Vin = 36V (air flow from Pin J1 to Pin J2 on PCB)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-033-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		80	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.63		16.75	W
Output Current	Current-limited, no damage, short-circuit protected	0.5		5	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		18	48	75	Vdc
Recommended External Fuse	Fast blow			2	A
Start-up Threshold	Rising input voltage	15.5	16.9	17.9	Vdc
Undervoltage Shutdown (50% load)	Falling input voltage	15	16	16.8	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = 24V		0.764	0.788	A
Full Load Input Current	Vin = 48V		0.388	0.403	A
Low Line Input Current	Vin = minimum		1.03	1.04	A
Inrush Transient			0.05		A2-Sec.
Short Circuit Input Current			0.05	0.1	A
Minimum Load Input Current	Iout = minimum, unit=ON		60	90	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	88.5	90		%
	Vin = 48V, full load	86.5	88.5		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		2,000,000		Hours
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		325	350	375	KHz
Startup Time	Power on to Vout regulated		10	50	mS
Startup Time	Remote ON to Vout regulated		10	50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		75	150	µSec
Dynamic Load Peak Deviation	same as above		±75	±125	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-033-Q48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.63	16.5	16.75	W
Voltage					
Nominal Output Voltage	No trim	3.2505	3.3	3.3495	Vdc
Setting Accuracy	At 50% load, no trim		1.5		% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom
Overvoltage Protection	Via magnetic feedback	4	5	5.6	Vdc
Current					
Output Current Range		0.5	5	5	A
Current Limit Inception	98% of Vnom., after warmup	5.9	7.3	8.4	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.25	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V			±0.25	% of Vout
Ripple and Noise	20 MHz BW, Vin = 48V		30	60	mV pk-pk
Temperature Coefficient	At all outputs		0.02		% of Vnom./°C
Maximum Capacitive Loading	Low ESR			5000	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	120	130	140	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

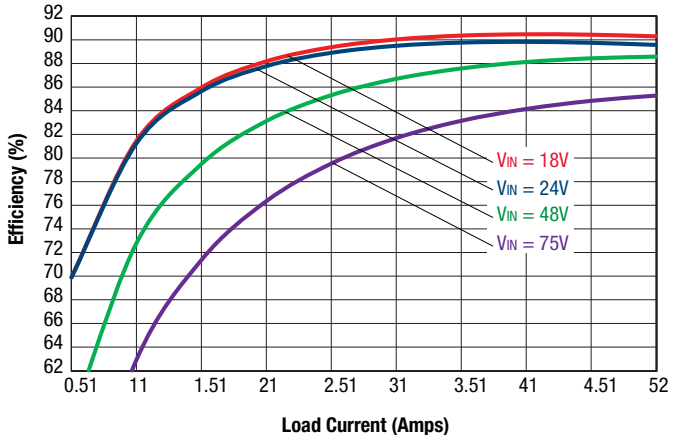
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

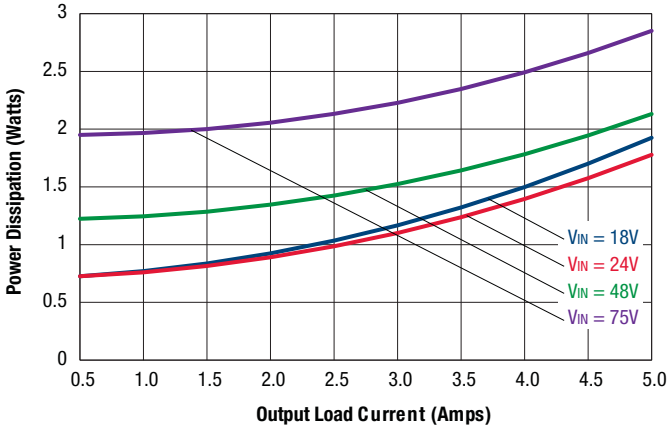
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-033-Q48

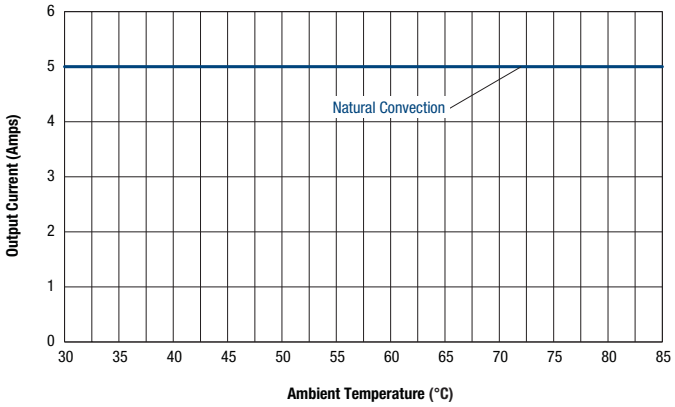
Efficiency vs. Line Voltage and Load Current @ 25°C



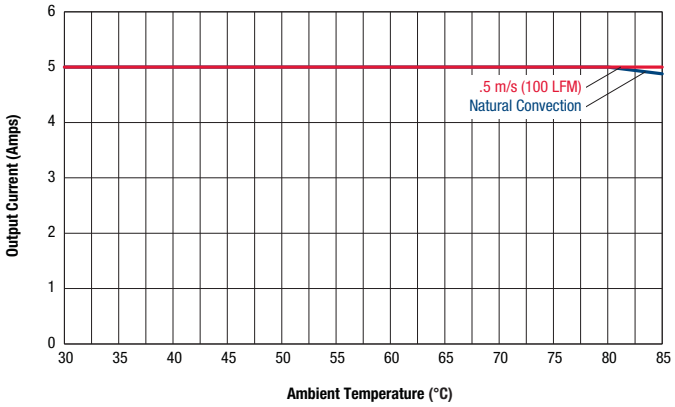
Power Dissipation



Maximum Current Temperature Derating at sea level
Vin = 18V, 24V, 36V, 48V, or 60V (air flow from Pin J1 to Pin J3 on PCB)



Maximum Current Temperature Derating at sea level
Vin 75 (air flow from Pin J1 to Pin J3 on PCB)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-050-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.23	W
Output Current	Current-limited, no damage, short-circuit protected	0.30		3	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.6	9	Vdc
Start up Threshold	@-40°C	9.5	10.0	10.5	Vdc
Undervoltage Shutdown	Falling input voltage	7.8	8.25	9	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.71	0.73	A
Low Line Input Current	Vin = minimum		1.91	1.97	A
Inrush Transient			0.05		A^2-Sec.
Short Circuit Input Current			50	100	mA
Minimum Load Input Current	Iout = minimum, unit=ON		105	135	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	85.5	88		%
	Vin = min., full load	86	87.3		%
Isolation					
Isolation Voltage	Input to output	1600			Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		6.2		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		330	350	370	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote ON to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		100	150	µSec
Dynamic Load Peak Deviation	same as above		±85	±125	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-050-Q12

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.23	W
Voltage					
Nominal Output Voltage	No trim	4.925	5	5.075	Vdc
Setting Accuracy	At 50% load, no trim	-1.5		1.5	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	5.75	5.9	7	Vdc
Current					
Output Current Range		0.3	3	3	A
Current Limit Inception	98% of Vnom., after warmup	3.5	4.75	6.5	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.05	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.1	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=24V		40	70	mV pk-pk
Temperature Coefficient	At all outputs		±0.02		% of Vnom./°C
Maximum Capacitive Loading	Low ESR			1000	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		105	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	110	115	120	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

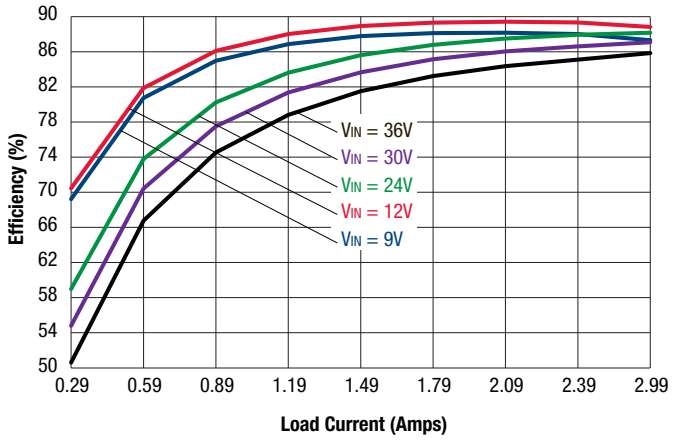
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

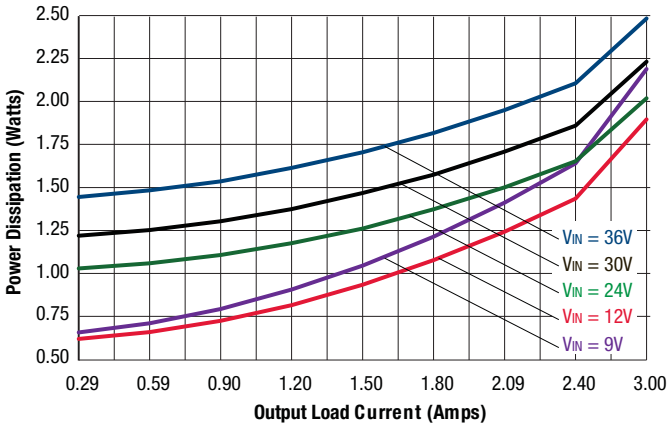
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-050-Q12

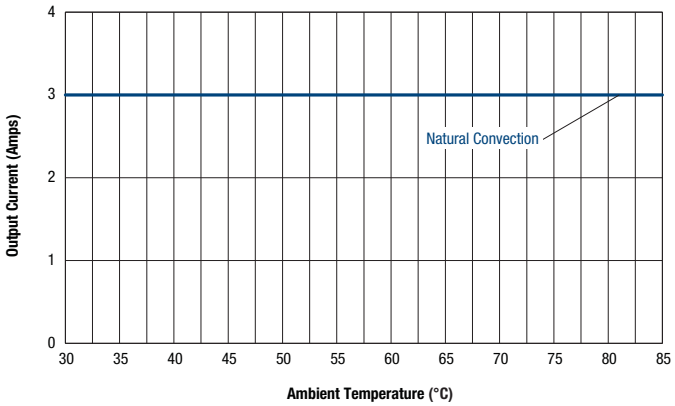
Efficiency vs. Line Voltage and Load Current @ 25°C



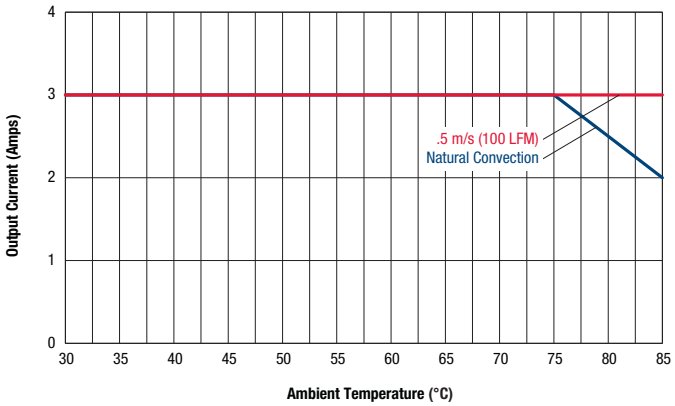
Power Dissipation



Maximum Current Temperature Derating at sea level
Vin = 9V, 12V, or 24V (air flow from Pin J1 to Pin J3 on PCB)

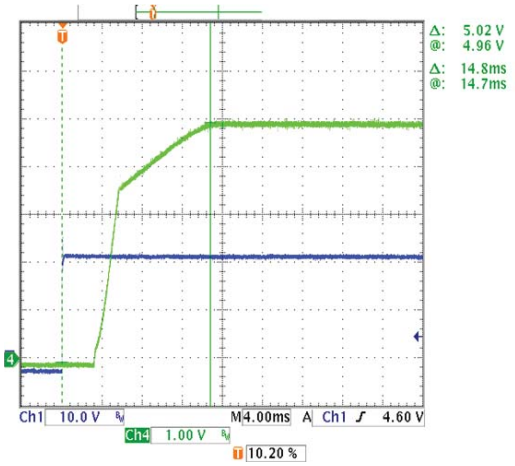


Maximum Current Temperature Derating at sea level
Vin 36 (air flow from Pin J1 to Pin J3 on PCB)

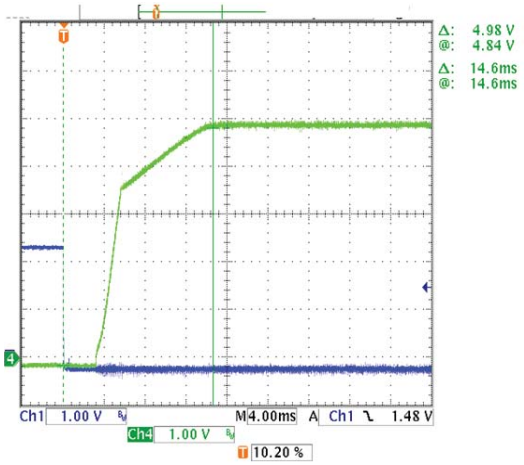


TYPICAL PERFORMANCE DATA, SPM15-050-Q12

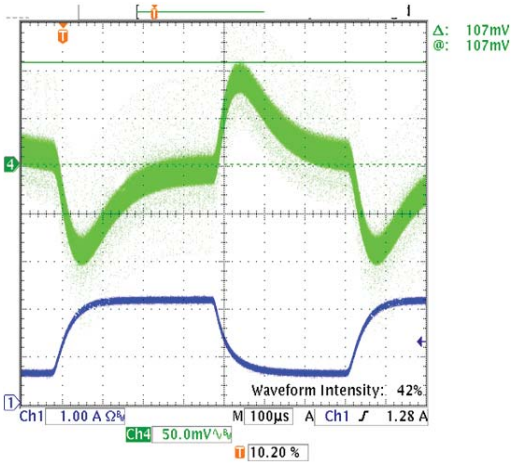
Start-up Delay (Vin = 24V, Iout = 3A, Cload = 1µF || 10µF, Ta = +25°C)
CH1 = Vin, CH4 = Vout



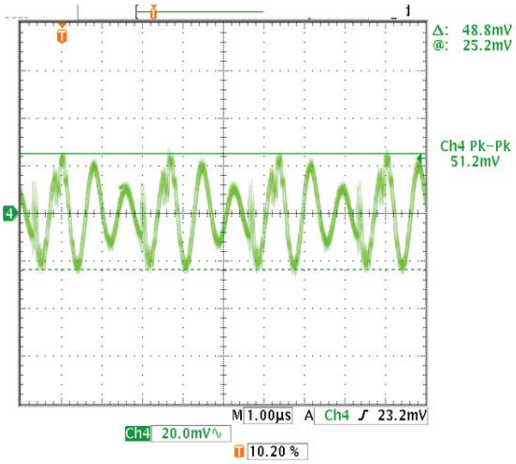
On/Off enable Delay (Vin = 24V, Iout = 3A, Cload = 1µF || 10µF, Ta = +25°C)
CH1 = Enable, CH4 = Vout



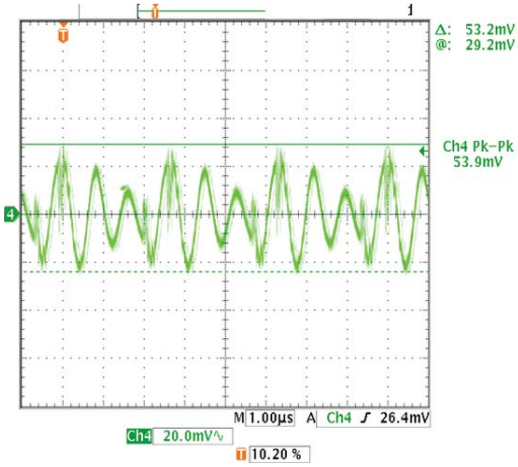
Stepload Transient Response (Vin = 24V, Iout = 0.75 to 2.25A to 0.75A,
Cload = 1µF || 10µF, Ta = +25°C) Ch1 = Iout, Ch4 = Vout



Output Ripple and Noise (Vin = 24V, Iout = 0.30A, Cload = 1µF || 10µF,
Ta = +25°C, BW = 20Mhz)



Output Ripple and Noise (Vin = 24V, Iout = 3A, Cload = 1µF || 10µF,
Ta = +25°C, BW = 20Mhz)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-050-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		80	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.48		15.23	W
Output Current	Current-limited, no damage, short-circuit protected	0.3		3	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		18	48	75	Vdc
Recommended External Fuse	Fast blow			1.5	A
Start-up Threshold	Rising input voltage	16	16.9	17.9	Vdc
Undervoltage Shutdown	Falling input voltage	15	16	17.5	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.35	0.37	A
Low Line Input Current	Vin = minimum		0.93	0.97	A
Inrush Transient			0.05		A^2-Sec.
Short Circuit Input Current			0.05	0.1	mA
Minimum Load Input Current	Iout = minimum, unit=ON		56	90	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 48V, full load	86.5	88.5		%
	Vin = min., full load	87.5	89.5		%
Isolation					
Isolation Voltage	Input to output			1600	Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		2		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		320	345	375	KHz
Startup Time	Power on to Vout regulated		10	50	mS
Startup Time	Remote ON to Vout regulated		10	100	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		60	120	µSec
Dynamic Load Peak Deviation	same as above		±50	±150	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-050-Q48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.48	15	15.23	W
Voltage					
Nominal Output Voltage	No trim	4.925	5	5.075	Vdc
Setting Accuracy	At 50% load, no trim	-1.5		1.5	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	6	7	8	Vdc
Current					
Output Current Range		0.3	3	3	A
Current Limit Inception	98% of Vnom., after warmup	3.75	4.5	5.5	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.3	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V			±0.2	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=48V		60	95	mV pk-pk
Maximum Capacitive Loading	Low ESR			470	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		85	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	130	135	150	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

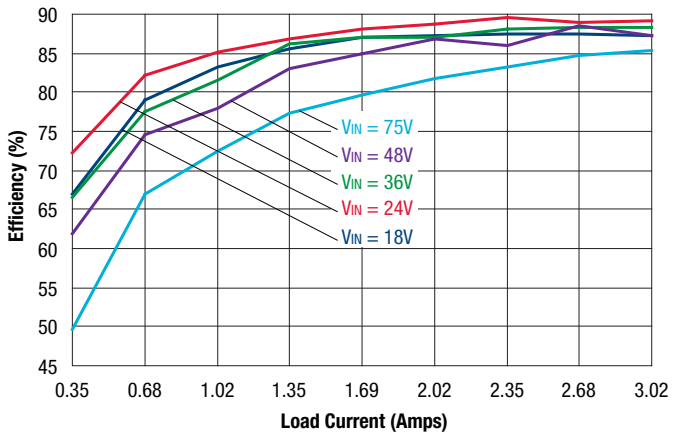
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

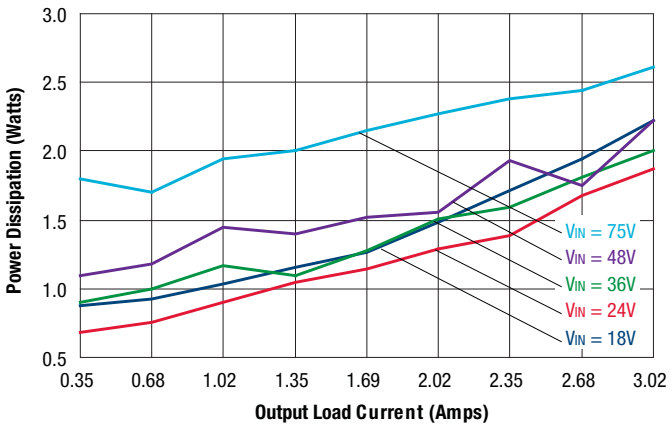
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-050-Q48

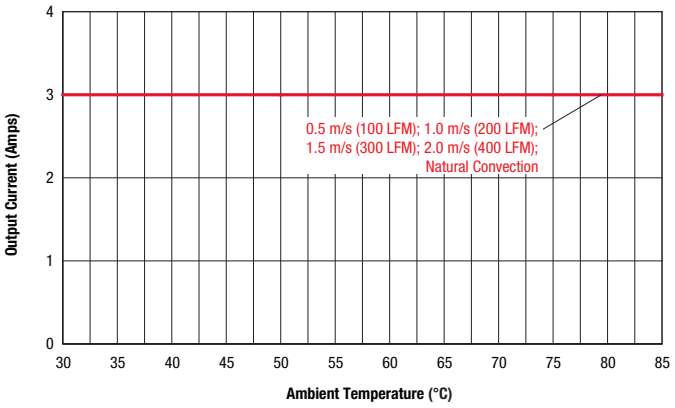
Efficiency vs. Line Voltage and Load Current @ 25°C



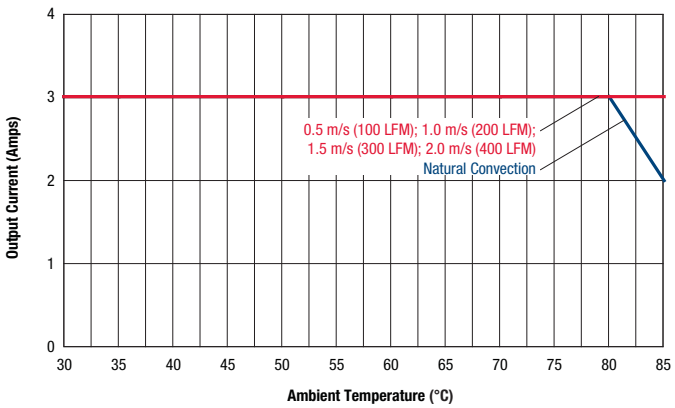
Power Dissipation



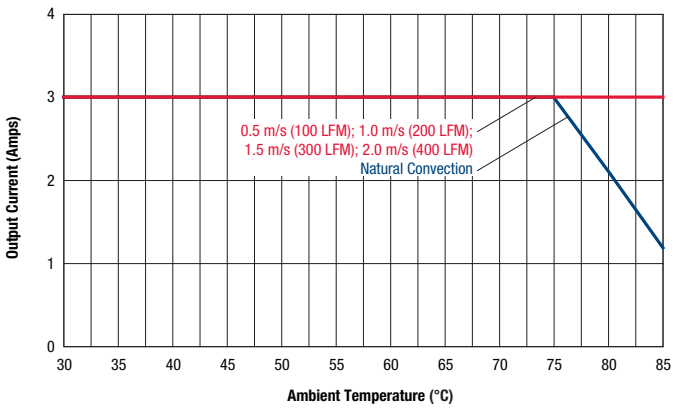
Maximum Current Temperature Derating at sea level
Vin = 18V, 24V, 36V, or 48V (air flow from Pin 1 to Pin 2 on PCB)



Maximum Current Temperature Derating at sea level
Vin 60 (air flow from Pin 1 to Pin 2 on PCB)



Maximum Current Temperature Derating at sea level
Vin 75 (air flow from Pin 1 to Pin 2 on PCB)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-120-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.54		15.76	W
Output Current	Current-limited, no damage, short-circuit protected	0.13		1.3	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating Voltage Range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up Threshold	Rising input voltage	8	8.5	9	Vdc
Undervoltage Shutdown	Falling input voltage	7.9	8.2	8.7	Vdc
Internal Filter Type			C		
Input Current					
Full Load Input Current	Vin = nominal		0.77	0.8	A
Low Line Input Current	Vin = minimum		2.05	2.11	A
Inrush Transient			0.05		A^2-Sec.
Short Circuit Input Current			50	120	mA
Minimum Load Input Current	Iout = minimum, unit=ON		105	130	mA
Shut-Down Input Current (Off, UV, OT)			1	2.5	mA
Reflected (Back) Ripple Current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	82.5	84		%
	Vin = min., full load	83	84.5		%
Isolation					
Isolation Voltage	Input to output	1600			Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		TBD		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		300	330	360	KHz
Startup Time	Power on to Vout regulated		5	50	mS
Startup Time	Remote ON to Vout regulated		5	50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		60	120	µSec
Dynamic Load Peak Deviation	same as above		±100	±150	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-120-Q12

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.54	15.6	15.76	W
Voltage					
Nominal Output Voltage	No trim	11.88	12	12.12	Vdc
Setting Accuracy	At 50% load, no trim	-1		1	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	15.5	17.2	19.5	Vdc
Current					
Output Current Range		0.13	1.3	1.3	A
Current Limit Inception	98% of Vnom., after warmup	1.5	2.1	2.6	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.05	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.1	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=24V		60	120	mV pk-pk
Temperature Coefficient	At all outputs		±0.02		% of Vnom./°C
Maximum Capacitive Loading	Low ESR			470	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		105	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	110	115	120	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

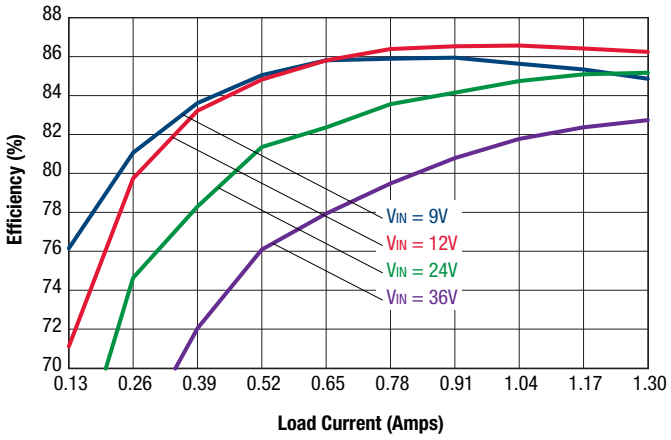
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

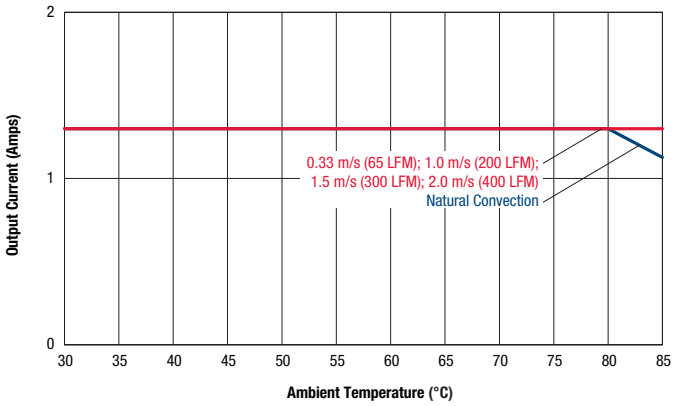
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-120-Q12

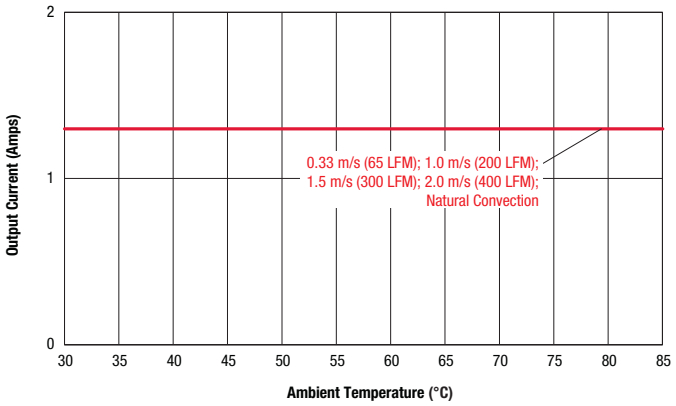
Efficiency vs. Line Voltage and Load Current @ 25°C



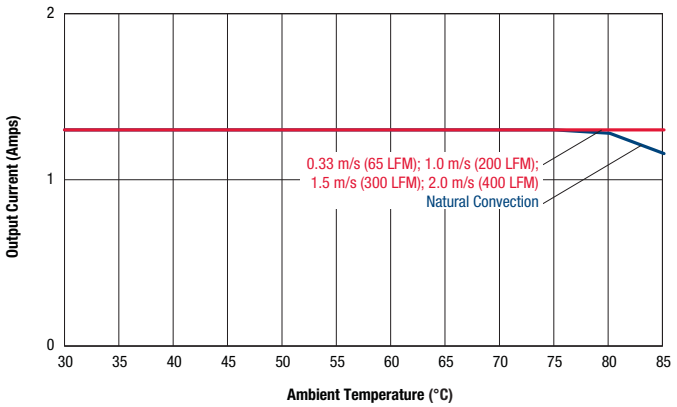
Maximum Current Temperature Derating at sea level
Vin = 9V (air flow from Pin 1 to Pin 2 on PCB)



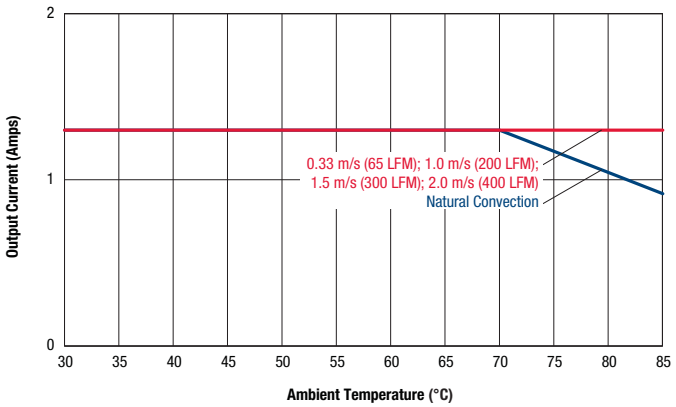
Maximum Current Temperature Derating at sea level
Vin = 12V (air flow from Pin 1 to Pin 2 on PCB)



Maximum Current Temperature Derating at sea level
Vin = 24V (air flow from Pin 1 to Pin 2 on PCB)

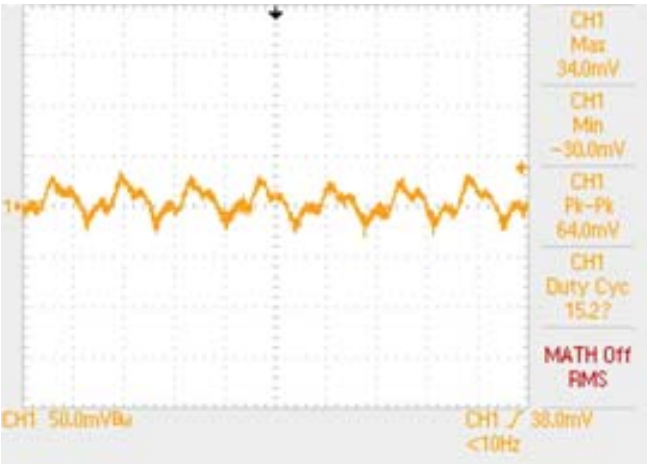


Maximum Current Temperature Derating at sea level
Vin = 36V (air flow from Pin 1 to Pin 2 on PCB)

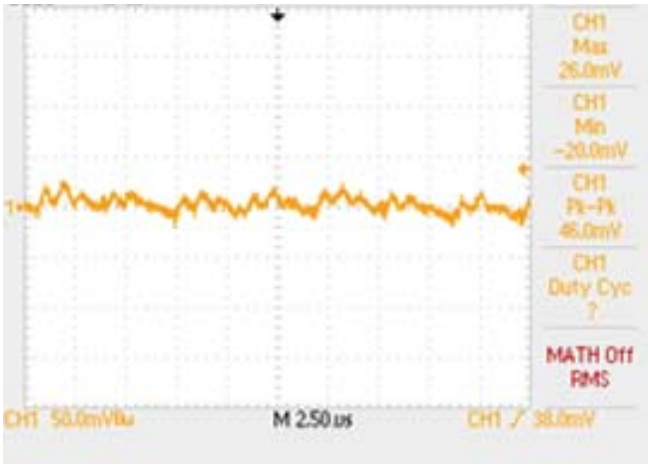


TYPICAL PERFORMANCE DATA, SPM15-120-Q12

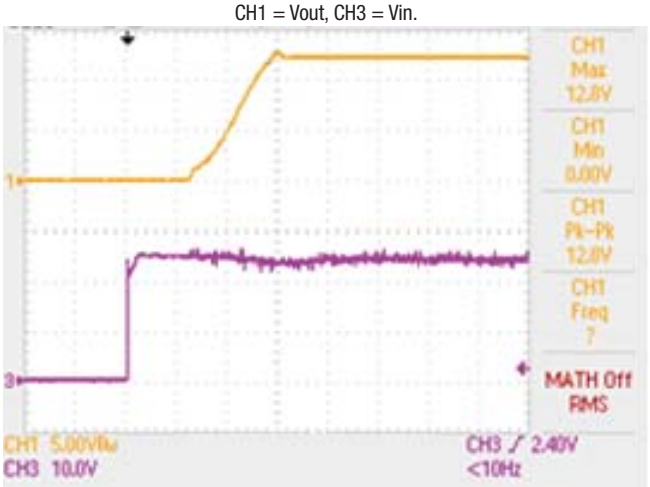
Output Ripple and Noise (Vin = 24V, Iout = 1.3A, Cload = 1µf || 10µF, Ta = +25°C, BW = 20Mhz)



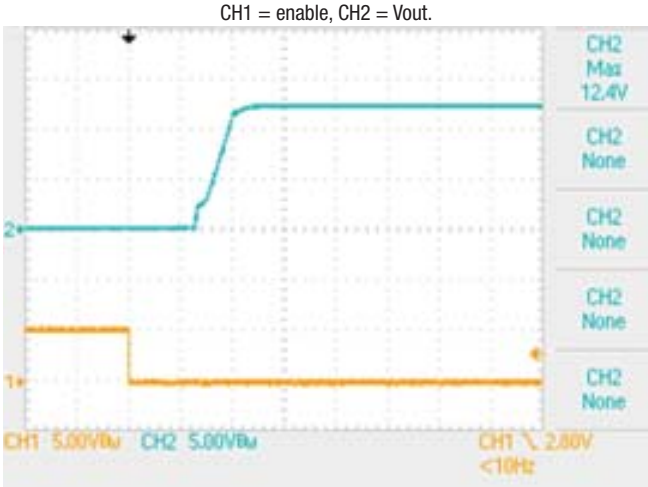
Output Ripple and Noise (Vin = 24V, Iout = 0.13A, Cload = 1µf || 10µF, Ta = +25°C, BW = 20Mhz)



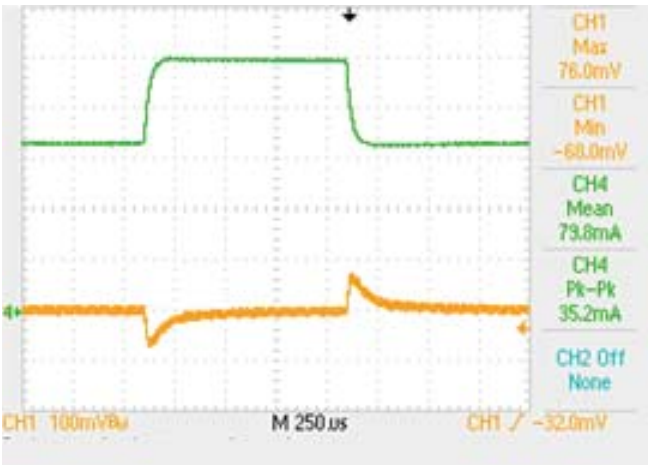
Start-up Delay (Vin = 24V, Iout = 1.3A, Cload = 470µF, Ta = +25°C) CH1 = Vout, CH3 = Vin.



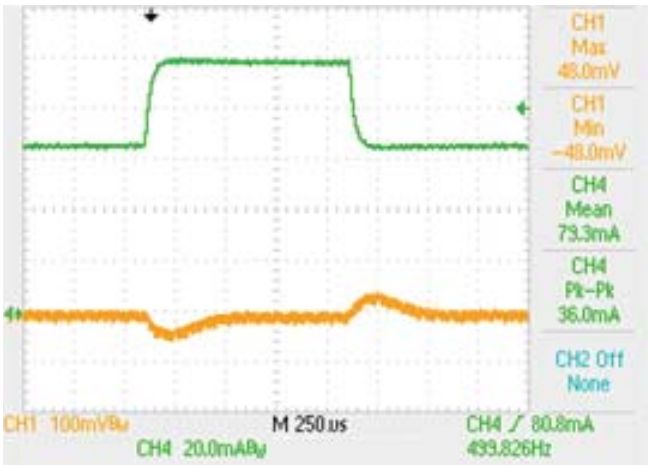
On/Off enable Delay (Vin = 24V, Iout = 1.3A, Cload = 470µF, Ta = +25°C) CH1 = enable, CH2 = Vout.



Stepload Transient Response (Vin = 24V, Iout = 50-75-50% of Imax, Cload = 1µf || 10µF, Io = 200mA/div, Ta = +25°C) CH2 = Vout, CH4 = Iout)



Stepload Transient Response (Vin = 24V, Iout = 50-75-50% of Imax, Cload = 470µF, Io = 200mA/div, Ta = +25°C) CH2 = Vout, CH4 = Iout)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-120-Q48

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		80	Vdc
Input Voltage, Transient	100 mS max. duration			100	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.54		15.76	W
Output Current	Current-limited, no damage, short-circuit protected	0.13		1.3	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating voltage range		18	48	75	Vdc
Recommended External Fuse	Fast blow			1.5	A
Start-up threshold	Rising input voltage	16	16.75	17.5	Vdc
Undervoltage shutdown	Falling input voltage	15	16	17	Vdc
Turn-On/Turn-Off Hysteresis			1.5		Vdc
Internal Filter Type			LC		
Input current					
Full Load Input Current	Vin = 24V		0.76	0.782	A
Full Load Input Current	Vin = 48V		0.387	0.400	A
Low Line Input Current	Vin = minimum		1.032	1.042	
Inrush Transient			0.05		A^2-Sec.
Short Circuit Input Current			50	100	mA
Minimum Load Input Current	Iout = minimum, unit = ON		56	90	mA
Shut-Down Input Current (Off, UV, OT)			1	2	mA
Reflected (back) ripple current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 48V, full load	82	85.5		%
	Vin = 24V., full load	84	84		%
Isolation					
Isolation Voltage	Input to output	1600			Vdc
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		6.4		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		300	335	370	KHz
Startup Time	Power on to Vout regulated		10	50	mS
Startup Time	Remote ON to Vout regulated		10	50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		50	100	µSec
Dynamic Load Peak Deviation	same as above		±125	±200	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-120-Q48

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.54	15.6	15.76	W
Voltage					
Nominal Output Voltage	No trim	11.88	12	12.12	Vdc
Setting Accuracy	At 50% load, no trim	-1		1	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	14.5	16.5	17.5	Vdc
Current					
Output Current Range		0.13	1.3	1.3	A
Current Limit Inception	98% of Vnom., after warmup	1.5	1.9	2.3	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			TBD	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.075	% of Vout
Load Regulation	Iout = min. to max., Vin = 48V			±0.05	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=48V		85	120	mV pk-pk
Temperature Coefficient	At all outputs		±0.02		% of Vnom./°C
Maximum Capacitive Loading	Low ESR			470	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See Derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		105	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	130	135	150	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

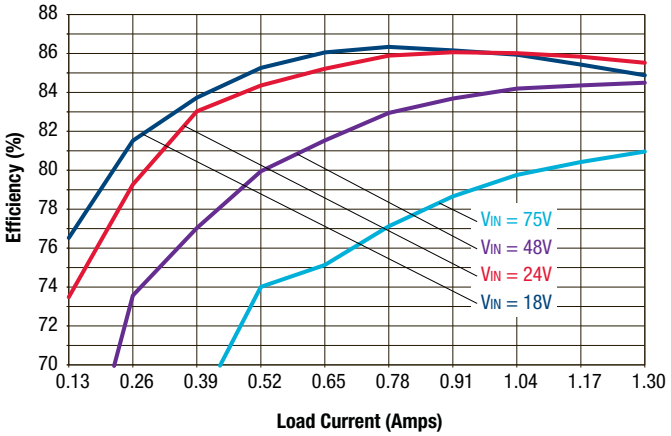
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 4.7 µF. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

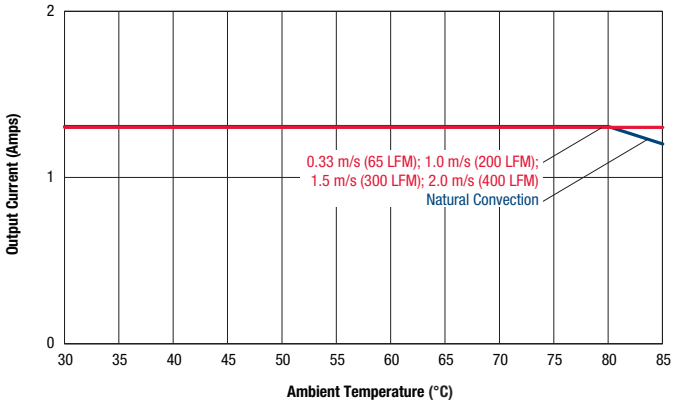
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-120-Q48

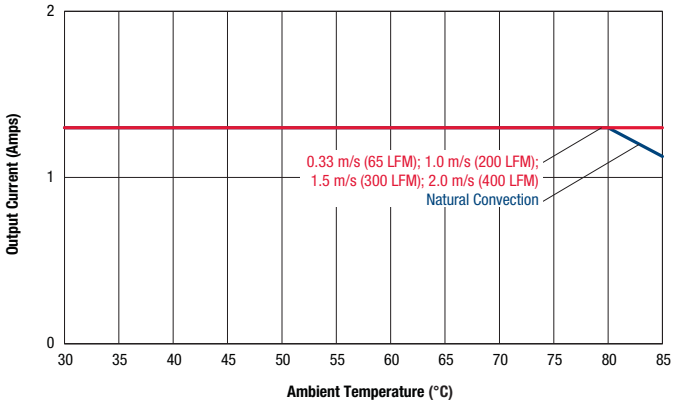
Efficiency vs. Line Voltage and Load Current @ 25°C



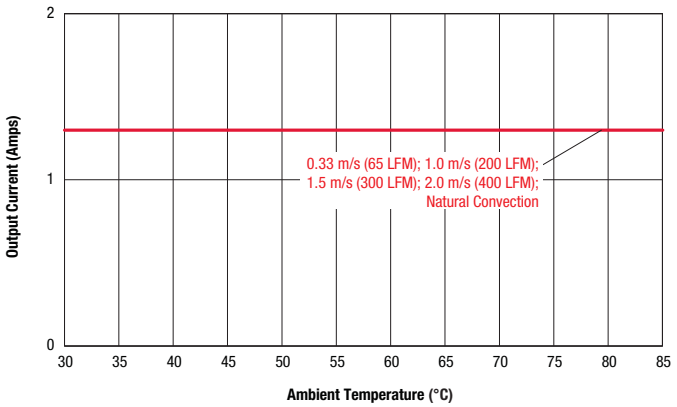
Maximum Current Temperature Derating at sea level
Vin = 18V (air flow from Pin 1 to Pin 2 on PCB)



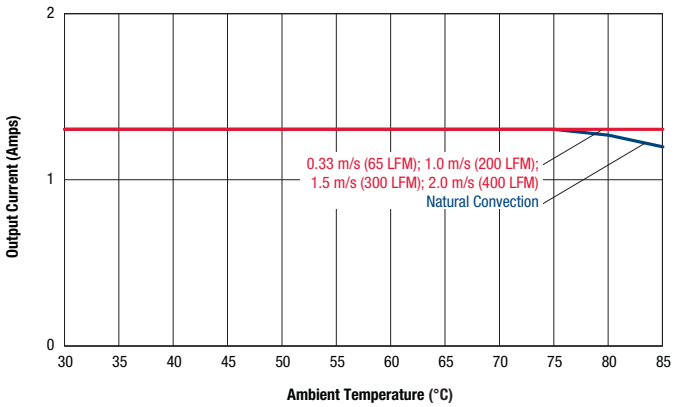
Maximum Current Temperature Derating at sea level
Vin = 24V (air flow from Pin 1 to Pin 2 on PCB)



Maximum Current Temperature Derating at sea level
Vin = 48V (air flow from Pin 1 to Pin 2 on PCB)



Maximum Current Temperature Derating at sea level
Vin = 75V (air flow from Pin 1 to Pin 2 on PCB)



FUNCTIONAL SPECIFICATIONS – MODEL SPM15-150-Q12

ABSOLUTE MAXIMUM RATINGS	Conditions ①	Minimum	Typical/Nominal	Maximum	Units
Input Voltage, Continuous		0		36	Vdc
Input Voltage, Transient	100 mS max. duration			50	Vdc
Isolation Voltage	Input to output			1600	Vdc
On/Off Remote Control	Power on, referred to -Vin	0		15	Vdc
Output Power		1.63		16.67	W
Output Current	Current-limited, no damage, short-circuit protected	0.11		1.1	A
Storage Temperature Range	Vin = Zero (no power)	-55		125	˚C
Absolute maximums are stress ratings. Exposure of devices to greater than any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied or recommended.					
INPUT					
Operating voltage range		9	24	36	Vdc
Recommended External Fuse	Fast blow			4	A
Start-up threshold (@+25°C and -40°C)	Rising input voltage	8	8.5	9	Vdc
Undervoltage shutdown	Falling input voltage	7.8	8.25	9	Vdc
Internal Filter Type			C		
Input current					
Full Load Input Current	Vin = nominal		0.82	0.84	A
Low Line Input Current	Vin = minimum		2.13	2.19	A
Inrush Transient			0.05		A^2-Sec.
Short Circuit Input Current			50	100	mA
Minimum Load Input Current	Iout = minimum, unit = ON		130	150	mA
Shut-Down Input Current (Off, UV, OT)			1	2.5	mA
Reflected (back) ripple current ②	Measured at input with specified filter		30		mA, p-p
GENERAL and SAFETY					
Efficiency	Vin = 24V, full load	82.5	84		%
	Vin = min., full load	84.5	86		%
Isolation					
Isolation Voltage	Input to output	1600			Vdc
Insulation Safety Rating			basic		
Isolation Resistance			10		MΩ
Isolation Capacitance			1500		pF
Safety	Certified to UL-60950-1, CSA-C22.2 No. 60950-1, IEC/60950-1, 2nd edition, with AM1		Yes		
Calculated MTBF	Per Telcordia SR332, issue 1, class 3, ground fixed, Tambient = +25°C		TBD		Hours x 10^6
DYNAMIC CHARACTERISTICS					
Fixed Switching Frequency		300	330	360	KHz
Startup Time	Power on to Vout regulated			50	mS
Startup Time	Remote on to Vout regulated			50	mS
Dynamic Load Response	50-75-50% load step, settling time to within 1% of Vout		100	150	µSec
Dynamic Load Peak Deviation	same as above		±150	±250	mV
FEATURES and OPTIONS					
Remote On/Off Control ③					
"N" suffix					
Negative Logic, ON state	ON = Ground pin	-0.7		0.8	V
Negative Logic, OFF state	OFF = Pin open	10		15	V
Control Current	Open collector/drain		1		mA
"P" suffix					
Positive Logic, ON state	ON = Pin open	10		15	V
Positive Logic, OFF state	OFF = Ground pin	-0.7		0.7	V
Control Current	Open collector/drain		1		mA

FUNCTIONAL SPECIFICATIONS (CONT.) – MODEL SPM15-150-Q12

OUTPUT	Conditions ① ③	Minimum	Typical/Nominal	Maximum	Units
Total Output Power		1.63	16.5	16.67	W
Voltage					
Nominal Output Voltage	No trim	14.85	15	15.15	Vdc
Setting Accuracy	At 50% load, no trim	1		1	% of Vnom
Output Voltage Range	User-adjustable	-10		10	% of Vnom.
Overvoltage Protection	Via magnetic feedback	17	19.5	22.5	Vdc
Current					
Output Current Range		0.11	1.1	1.1	A
Current Limit Inception	98% of Vnom., after warmup	1.2	1.6	2	A
Short Circuit					
Short Circuit Current	Hiccup technique, autorecovery within ±1.25% of Vout			0.3	A
Short Circuit Duration (remove short for recovery)	Output shorted to ground, no damage		Continuous		
Short circuit protection method	Current limiting				
Regulation					
Line Regulation	Vin = min. to max., Vout = nom., Iout = nom.			±0.1	% of Vout
Load Regulation	Iout = min. to max., Vin = 24V			±0.1	% of Vout
Ripple and Noise	5 Hz- 20 MHz BW, Vin=24V		130	175	mV pk-pk
Temperature Coefficient	At all outputs		±0.02		% of Vnom./°C
Maximum Capacitive Loading	Low ESR			470	µF
MECHANICAL					
Outline Dimensions			1 x 1 x 0.41		Inches
(Please refer to outline drawing)	WxLxH		25.4 x 25.4 x 10.41		mm
Weight			0.69		Ounces
			19.56		Grams
Through Hole Pin Diameter			0.04		Inches
			1.016		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
ENVIRONMENTAL					
Operating Ambient Temperature Range	See Derating	-40		85	°C
Operating Case Temperature Range	No derating	-40		105	°C
Case Material	Tin plated steel with black powder coat				
Storage Temperature	Vin = Zero (no power)	-55		125	°C
Thermal Protection/Shutdown	Measured in center	110	115	120	°C
Electromagnetic Interference	External filter is required				
Conducted, EN55022/CISPR22			B		Class
RoHS rating			RoHS-6		

Notes

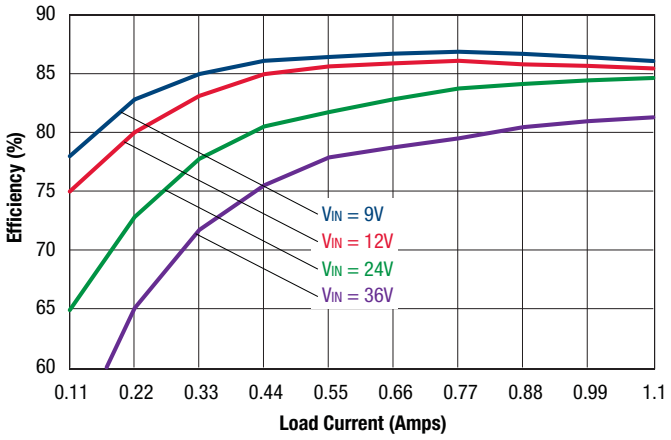
① Unless otherwise noted, all specifications are at nominal input voltage, nominal output voltage and full load. General conditions are +25° Celsius ambient temperature, near sea level altitude, natural convection airflow. All models are tested and specified with external parallel 1 µF and 10 µF output capacitors. The external input capacitor is 100 µF, electrolytic. All capacitors are low-ESR types wired close to the converter.

② Input (back) ripple current is tested and specified over 5 Hz to 20 MHz bandwidth. Input filtering is Cbus=220 µF, Cin=33 µF and Lbus=12 µH.

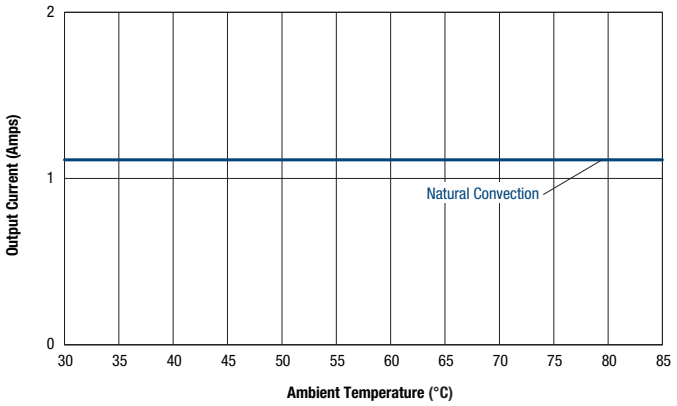
③ The Remote On/Off Control is referred to -Vin.

TYPICAL PERFORMANCE DATA, SPM15-150-Q12

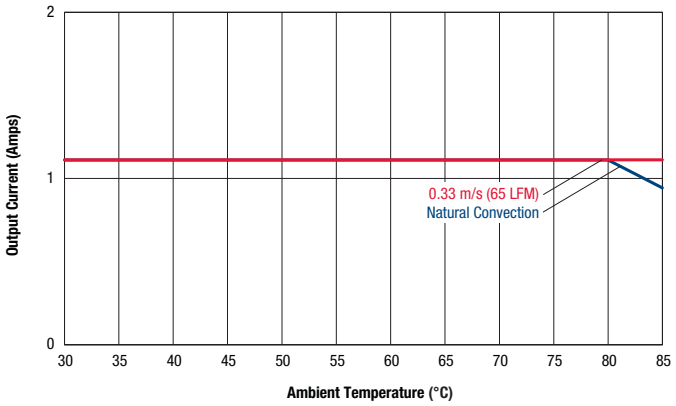
Efficiency vs. Line Voltage and Load Current @ 25°C



Maximum Current Temperature Derating at sea level
Vin = 9, 12, or 24V (unit monuted on PCB)*



Maximum Current Temperature Derating at sea level
Vin = 36V (air flow is from J1 to J3 on PCB*



*Using Burn in board, connection with solder